



## United States Department of the Interior

### FISH AND WILDLIFE SERVICE

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Portland, Oregon 97232-4181

IN REPLY REFER TO:

**FEB 16 1998**

William Stelle, Jr.  
Regional Administrator, Northwest Region  
National Marine Fisheries Service  
7600 Sand Point Way NE,  
Bldg. 1, Bin\_157000  
Seattle, Washington 98115-0070

Dear Mr. Stelle:

This letter transmits the U.S. Fish and Wildlife Service's comments on "A Draft Proposal to Improve Oregon Forest Practices" (proposal) being submitted by the National Marine Fisheries Service (NMFS) to the Oregon Board of Forestry Advisory Committee on Forest Practices (Committee) and the Office of the Governor.

We realize that coho salmon and other anadromous fish concerns have been the primary driver of this proposal. However, numerous other species are associated with riparian and aquatic habitats. Seventeen non-salmonid and/or non-anadromous (resident) fish species, including five endemic to Coast Range river systems, are found in western Oregon. In addition, some studies have indicated that over 80 percent of terrestrial vertebrate species in western Oregon utilize riparian and aquatic habitats for at least some portion of their life histories. The number of species that are absolutely dependent on these habitats for their survival easily reaches into the dozens.

We strongly encourage NMFS and the Committee to consider the relevance of these other species. This relevance is fundamental in several ways. First, while the status of the coho can, to some extent, be a surrogate measure of overall watershed conditions, a much better indicator is the structure of whole fish communities, including resident species. Persistent changes to stream habitats are more likely to be detectable through the status of multi-species assemblages than through long-term trends of an individual species, especially when that species is at least partially subject to conditions and activities that occur outside of the watershed.

Secondly, many of these other species have themselves been identified as indicators of the habitats under discussion here. The needs of these species provide us with critical additional insight into our overall efforts to maintain and restore healthy watersheds. Numerous amphibian species fall into this category.

And finally, it is important that landowners and policy makers understand the potential range of benefits represented by a more comprehensive consideration of forest practices. These potential benefits include healthier watersheds and a reduction in the need for, and implications of, future listings under the Endangered Species Act (ESA). Expanding the focus of the Committee's efforts would also enhance the likelihood of meeting the conservation criteria for multi-species Habitat Conservation Plans. With many of these other riparian-associated species considered at risk, any proposal should be evaluated in this context.

In addition to providing comments on the proposal, and to help facilitate the consideration of a more comprehensive strategy, we have analyzed the potential benefits of the proposal to other fish and riparian-dependent amphibian species. This analysis, which is contained in the attached draft report, focuses on non-salmonid and/or non-anadromous fish and a few riparian-associated amphibians. Our goal was to deal with the species that are most likely to be of concern to forest landowners due to current at-risk status and most likely to be directly impacted by changes in riparian management standards.

Through our analysis of benefits to other fish and amphibian species we have concluded the following:

Overall, the stream and road management measures proposed by NMFS provide a very strong foundation for restoration and enhancement of watershed-wide conditions over time. They should allow for significant support of the conditions critical to the needs of the species addressed in our report. This support would represent a very meaningful improvement over current forest practices for riparian management.

- o The recommended measures should allow for proper functioning of fish-bearing streams and perennial non-fish bearing streams and the crucial habitat values associated with those waterways.
- o Implementation of the proposed measures on non-federal lands would go a long way towards allowing for coverage of riparian and aquatic associated species, whether listed or unlisted, in Habitat Conservation Plans for individual landowners.
- o Some refinements are needed to protect and buffer key habitats that occur outside of riparian boundaries, including wetlands, seeps, and springs. Additional refinements are needed to deal with unstable soil and steep slope areas, watershed assessments, and use of pesticides, herbicides, and other chemicals.

Our general conclusion is that your proposal, with further refinement through the efforts of the Committee, could become the basis for a much more comprehensive and beneficial resource conservation strategy.

#### General Comments on the NMFS Proposal

The FWS believes that NMFS has done an excellent job of providing critical background information regarding the legal and biological basis of the proposal. The synopsis of the status of coho salmon stocks, the historical account of land-use changes that have altered fish habitats and the objectives for non-federal lands in coastal Oregon support the proposed comprehensive strategy for achieving proper riparian function. The proposal's effort to complement the State's Oregon Coastal Salmon Restoration Initiative (CSRI), which has evolved into the broader Oregon Plan, is also noteworthy.

One of the prerequisites of an effective conservation strategy is that it be based on sound science. Establishment of the Landslide, Riparian Management and Cumulative Effects science teams is consistent with this approach and has provided additional technical expertise, as well as the incorporation of independent review and analysis of the proposal. The use of researched interim measures and eventual watershed analyses is also consistent with this approach. A well-developed, scientifically-based watershed analysis process should allow for the refinement of site-specific management standards to more effectively achieve proper riparian and aquatic function on a watershed or sub-watershed scale. However, until such processes are implemented and completed, sound biological principles dictate we reduce the risk of additional degradation of existing riparian conditions. The proposed interim measures should accommodate this goal.

Throughout the proposal, NMFS has emphasized the reduction of additional adverse impacts while simultaneously promoting restoration of important aquatic ecosystem functions. The FWS supports this approach to salmonid recovery. We believe it will benefit not only anadromous salmonids but many other riparian dependent species, as well as overall watershed health.

#### Specific Comments on the NMFS Proposal

Under the MOA between NMFS and the State, the proposal specifically targets coho and occasionally mentions "other anadromous fish". Other anadromous fish will obviously benefit from the proposal to some extent. We recommend that NMFS and the State consider expanding the list of fish species and the geographic area being addressed, especially due to the known large number of degraded riparian areas throughout Oregon and the potential widespread benefits that can be achieved through proper watershed scale management.

The NMFS proposal directly applies only to the Oregon Forest Practices Act (OFPA). However, among the major identified areas of concern for coho are floodplains, lowlands, and low gradient stream habitats where significant channel modification and land-use changes have occurred. NMFS should continue to work closely with the State and other pertinent Federal programs, especially those

administered by the Department of Agriculture and the Environmental Protection Agency, to address the other factors that influence the status of anadromous salmonids.

The NMFS proposal does not directly apply to OFPA standards for non-stream riparian and aquatic areas such as wetlands, seeps or springs. These hydrogeologic features benefit coho by serving as important sources of colder, clean groundwater' that filters into streams. These areas also represent important habitats for other fish and wildlife species. Improved standards for such areas are warranted.

Road management planning as suggested by the proposal will be a vital component to restoring watershed health. Many of the road management actions suggested by NMFS will require technical expertise and funding beyond what may be available to smaller forest land owners. Means of assisting landowners to develop and implement road management plans should be addressed.

The preliminary information from the recent study by the Oregon Department of Forestry evaluating numerous 1996 landslide events should be included or referenced in the proposal to highlight the farranging impacts of such mass wasting events and their relationship to forest management activities and naturally occurring phenomena.

The interim measure identified as 'monitoring and adaptive management' is an important component of assessing and addressing the impacts of land management activities on watershed conditions. The discussions under monitoring and adaptive management, however, are more explanatory than prescriptive. If monitoring and adaptive management are to be a component of interim measures, then additional details will be needed to describe how they fit into the interim strategy.

The section describing the technical rationale for the proposed interim measures is very helpful in providing the scientific background used to develop the proposal. The scale of effort involved in reviewing the available literature is evident and significantly reduces the number of potential outstanding questions regarding the basis and relevance of the proposed measures. We suggest that the sections on forest chemicals and monitoring be expanded. As discussed previously, monitoring is such an important component that it should receive additional attention. The discussion under potentially unstable areas prone to landslides includes a suggestion that may be appropriate as a specific recommendation. This suggestion calls for the development of shallow landslide potential maps for the entire Oregon Coast Range and goes on to explain why this is needed. How this suggestion -fits within the overall proposal should be clarified.

The discussion on restoration activities should be clarified and expanded. We believe that restoration activities are an important option under riparian management. If implemented haphazardly or too broadly, restoration activities may not achieve the desired results or may even detract from overall recovery efforts. Targeted, local-scale activities can be helpful provided their long and short term effects are considered. The FWS and the State have been involved in restoration activities that have been demonstrated to be effective. Watershed analyses should identify additional opportunities for such restoration action. Furthermore, Federal and State agencies have existing funded programs to carry out restoration activities that often involve a multidisciplinary approach

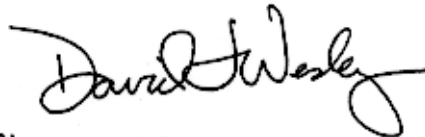
to design and construction such that actions taken are more likely to succeed and provide long term benefits.

The use of watershed analysis is possibly the most significant component of the proposal. The interim measures are serving as guidance until a more watershed specific analysis can determine what measures may in fact be needed to achieve proper riparian function. Unfortunately, the exact design of the watershed analysis to be used in Oregon is not known at this time. A Draft Oregon Assessment Manual has been developed as part of the CSRI and is currently undergoing review. The proposal states that the NMFS science discussion groups have raised a number of concerns about current watershed analysis approaches. Two general options are presented that attempt to address their concerns and serve as good starting points. Existing examples of watershed analysis (Federal and Washington State) require technical expertise to carry out. Some of the geophysical processes to which NMFS has referred in the proposal are complex. The success of watershed analysis on private lands as administered under the OFPA will hinge on the ease of use while maintaining the robustness of scientific principles that lead to appropriate land management decisions. Furthermore, watershed analysis is only a tool. The development of appropriate management actions to be taken as a result of watershed analysis is critical. Monitoring and adaptive management play an important role at this point. We encourage NMFS to continue to work closely with the State to agree to a watershed analysis protocol and methodology that addresses NMFS's concerns while allowing for flexibility.

The discussion of cumulative watershed effects and cumulative effects analysis reveals the difficulty in addressing these issues. We agree with NMFS's statement that cumulative effects are central to watershed protection and restoration, and we are pleased that NMFS is proposing to work with the Committee and the scientific community to develop an appropriate methodology for cumulative effects analysis.

We commend NMFS and the State for working through the Memorandum of Agreement to jointly develop a strategy that supports the long-term conservation of coho and may preclude the need to list the species. Part of the mission of the FWS is to conserve the ecosystems upon which fish and wildlife depend for the benefit of people. To that end, we commit to assist NMFS and the State in any way that we can to finalize a long term plan to conserve and recover coho. We are also optimistic that full consideration of the proposal and our recommendations will contribute to the resolution of resource problems that go well beyond the plight of the coho.

Sincerely,

A handwritten signature in black ink, appearing to read "David H. Wesley". The signature is fluid and cursive, with a long horizontal stroke at the end.

For: Michael Spear  
Regional Director

## ATTACHMENT

### POTENTIAL BENEFITS TO SELECTED FISH AND AMPHIBIAN SPECIES OF THE NATIONAL MARINE FISHERIES SERVICE'S PROPOSAL TO IMPROVE OREGON FOREST PRACTICES

The U.S. Fish and Wildlife Service (FWS) believes that the measures presented within the National Marine Fisheries Service's (NMFS) proposal to improve Oregon forest practices can offer benefits to a broad range of species. This is particularly true of riparian and stream dependent species such as fish and amphibians. If the proposed measures are adopted by the Board of Forestry and incorporated into rules administered under the Oregon Forest Practices Act, the benefits associated with full implementation of the measures would go a long way toward addressing the conservation needs of many species. By restoring properly functioning aquatic and riparian habitat conditions, the need for or implications of future State or Federal endangered species act protections for additional native fish and amphibian species would be significantly reduced.

In evaluating the extent to which the NMFS proposal may benefit species of concern, we have not assumed complete elimination of adverse impacts as a prerequisite. Our evaluation is premised on a risk management approach to conservation. Habitats with the highest potential value to the species are prioritized for protection and impacts with the greatest potential to reduce conservation and recovery goals are prioritized for minimization. This approach emphasizes the reduction of additional significant adverse impacts while simultaneously promoting restoration of important aquatic ecosystem functions.

Overall, FWS finds that the stream and road management measures proposed by NMFS provide a very strong foundation for restoration and enhancement of watershed-wide conditions over time. They also represent a significant improvement in the support of the conditions required by the species addressed in this document relative to current practices. Although there is little information available on the specific habitat requirements of non-salmonid fishes, comparison of their distribution and thermal tolerances suggests that measures that improve watershed function adequate to sustain coho salmon would also assist populations of non-salmonid fishes. The fairly high level of protection given perennial streams and associated sensitive sites should help to maintain or restore the quality, quantity and connectivity of habitats critical to the fish and amphibian species discussed below.

The NMFS proposal recommends buffer widths for fish-bearing, perennial non-fish bearing, and seasonal non-fish-bearing streams. The available scientific literature contains a wide variety of recommendations for appropriate buffer widths to achieve different environmental or habitat based objectives. We have referenced this information in order to illustrate that while a range of prescriptions exists targeting specific riparian functions, a common theme is none the less being portrayed. We then relate this information to the NMFS proposal as it applies to species other than coho salmon.

#### Species Addressed

Although a broad range of species would benefit from the NMFS proposal, this analysis focuses on native non-salmonid fishes (resident freshwater and anadromous) and a limited subset of amphibians.

#### A. Native Coast Range Fishes

There are 23 native fish species in Coast Range streams in Oregon. Compared to eastern forested ecosystems, the native resident freshwater fish fauna of western Oregon is relatively sparse (Naiman et al. 1992), with local pockets of endemism. There are seven native anadromous species: coho, chinook, and chum salmon; sea-run coastal cutthroat and steelhead trout; and, Pacific and river lamprey. There are 18 native resident fish species: rainbow and resident coastal cutthroat trout; western brook lamprey; Umpqua chub; Umpqua and northern squawfish; Umpqua, Millicoma (longnose), and speckled dace; reddsideshiner; three-spined stickleback; largescale and Klamath smallscale sucker; and torrent, coast range, prickly, riffle and reticulate sculpin. (The sum of the anadromous (7) and resident fishes (18) does not equal the total number of species (23) because two species (rainbow trout, coastal cutthroat trout) have both resident (rainbow and resident coastal cutthroat trout) and anadromous (steelhead and sea-run cutthroat trout) forms.)

Diversity of native resident fishes per basin generally increases from north to south to the Umpqua River, where there are a number of endemic species. The number of species per basin generally decreases again continuing south. Species endemic to Coast Range streams are, from north to south: Umpqua squawfish (Siuslaw River); Umpqua dace, Umpqua chub, Umpqua squawfish (Umpqua River); and, Millicoma dace (Coos River system). The remaining native freshwater fishes, although not endemic to Coast Range systems, are important to the biodiversity, ecology, biology, and genetic makeup of these streams.

##### 1. Ecological requirements of native coast range fishes

Native fishes (anadromous and resident) have been evolving in the Coast Range ecosystem since the Pliocene (about 5 million years ago; Minckley et al 1986) and are well adapted to the Coast Range ecosystem. In evolutionarily recent times, this ecosystem has undergone changes brought about by human impacts (logging, mining, grazing, urbanization, agriculture, road building, fire suppression). These anthropogenic effects have degraded overall Coast Range anadromous fish habitats by between 55 percent and 96 percent, depending on which indicators are used (Edwards 1992; Gregory and Bisson 1996; Kellogg 1992; NMFS 1996; Norse 1990; Spies and Franklin 1988). Only recently have the elements necessary for ecologically healthy ecosystems begun to be studied. Studies have examined the physical parameters of healthy ecosystems and also the ecological requirements of declining species. For fishes, this has translated into extensive work describing the habitat requirements and ecological pathways of declining salmon populations.

Salmonids have been variously described as keystone species (Willson and Halupka 1995) and indicator species (Smitch 1997), and fall into the category of charismatic species which Wilson (1992) noted, "...are but the representatives of thousands of lesser-known species that live with them..." Other native fishes (lampreys, sculpin, squawfish, shiners, dace, chub, suckers, sticklebacks) in Oregon's Coast Range streams are "lesser-known species". Very little information exists on the life

histories and habitat requirements of these native Coast Range fishes (Bisson et al. 1992).

The characteristics of Coast Range ecosystems important to all fishes are water quality, water quantity, stream sediment regimes, channel characteristics, riparian vegetation, and watershed condition. These characteristics are important in providing a more complex habitat made up of a variety and range of hydraulic conditions (i.e., depths and water velocities), number of pieces and size of woody debris, frequency of occurrence and types of habitat, and variety and character of substrates. Habitat complexity is a prime factor influencing diversity of stream fish communities (Thomas et al. 1993) and resiliency of the stream community. These characteristics have only been quantified for salmonids and generally have been species specific. Single species habitat requirements do not take into account complex assemblages of salmonid species and stocks (Thomas et al. 1993) and certainly have omitted any mention of resident species habitat requirements.

Available information on eight native resident fishes is presented here. Omission of information on the remaining ten species indicates no specific information was found.

Resident coastal cutthroat trout (*Oncorhynchus clarki clarki*) and reticulate sculpin (*Cottus perplexus*) inhabit headwater streams. They are often the only fishes above impassable barriers. Connolly (1997) found that the best indicator of biomass of age-1 and older cutthroat trout in Oregon coastal streams was large woody debris (LWD). He also found that age-1 and older cutthroat trout were also more often associated with pools than other types of habitat and that the frequency of pools was directly related to the frequency of LWD. Reeves et al. (1997) reported that older age classes of cutthroat trout preferred complex pools and were more associated with cover when in the presence of other salmonids. Solazzi et al. (1997) suggest increasing beaver populations as the best method of increasing prime habitat for cutthroat trout based on their finding that age-1 cutthroat trout, sampled in similar habitats in summer and winter, showed greater abundances in beaver ponds and dammed pools that contained large amounts of LWD.

Pools are also important to young of the year cutthroat trout. Connolly (1997) found that pools were especially important for age-0 cutthroat trout in high-gradient sandstone streams, and that they utilized pools to a higher extent when older cutthroat trout were absent. Solazzi et al. (1997) found that age-0 cutthroat trout preferred intermediate velocity habitats over high or low velocity habitats (glides, riffles and scour pools vs. cascades, rapids, dammed and backwater pools) during the summer. In winter, however, these age-zero fish show little differential preference among habitat types.

Reticulate sculpin (*Cottus perplexus*) are also found in headwater Coast Range streams. Larvae are common in edgewater and in sand or silt substrates. They prefer stream temperatures less than 15.5 degrees C, and the lethal upper temperature is 28 degrees C (Bond 1963). They appear to be temperature sensitive as evidenced by local extirpation following an unusually hot slash burn after logging (Connolly 1996). Krohn (1968) documented two age class failures following this disturbance. Baltz et al. (1982) also showed reticulate sculpin to be temperature sensitive, preferring cooler temperatures. Bateman (pers. comm.) found positive selection of cobble sized substrate (over gravel and boulder) and moderate embeddedness (6-25% over medium 26-50%, and high 51-75%

embeddedness) for nest sites. Studies comparing clearcut and unlogged streams have found declines in numbers of reticulate sculpin following clearcut logging events (Moring and Lantz 1975; Bateman, pers. comm.; Krohn 1968).

Prickly sculpin (*Cottus asper*) is a lowland resident in habitats characterized by sand and silt, favoring pools. Upper thermal tolerance is 24 degrees C, and oxygen concentrations below 1.9 ppm are lethal. Spawning habitat includes large cobble, and larvae are planktonic (Sheehan 1993).

Following clearcut logging the numbers of western brook lamprey (*Lampetra richardsoni*) passing through a trap decreased from 23.4 to 7.8 fish per year. Numbers of western brook lamprey passing downstream did not change in an uncut control stream (Moring and Lantz 1975). Western brook lamprey are stenotherms (Li et al. 1986). Both western brook and Pacific lamprey (*Lampetra tridentata*) require riffle areas with sandy gravel bottoms for spawning and quiet pools with soft bottoms for burrowing larvae (Bond 1974). Numbers of Pacific lamprey declined slightly following logging (Moring and Lantz 1975). Pacific lamprey are mesotherms.

Little information exists for the Millicoma dace (*Rhinichthys cataractae* ssp.), a close relative of the longnose dace (*Rhinichthys cataractae*). Differences between the longnose dace and the Millicoma dace are presented in Bisson and Reimers (1977). The Millicoma dace's size and shape make it adapted for living among the cobbles and gravel on the bottom of swift streams (ODFW 1995). Habitat use by the Millicoma dace must be inferred from information available for longnose dace. Wydowski and Whitney (1979) report longnose dace inhabiting swift-running streams and preferring summer temperatures of 12 to 21 degrees C. Spawning occurs in late spring or early summer on gravel bottoms of shallow riffles when water temperature reaches 12 degrees C. Populations of Millicoma dace may be depressed due to past splash damming which removed gravel and cobble from river systems (ODFW 1995).

Speckled dace (*Rhinichthys osculus*) appear to be competitively superior to rainbow trout in waters that are warm. They out competed rainbow trout in waters 19-22 degrees C (Reeves et al. 1987). They are usually found in cool flowing streams with rocky substrate, are generally bottom browsers on small invertebrates, but are habitat and food generalists (Lee et al. 1980).

The Umpqua chub (*Oregonichthys kalawatseti*) is only found in the Umpqua River. Markle et al. (1991) found it in runs, sloughs or pools where flow was generally slow and daytime water temperatures ranged from 17-26 degrees C. Bottom type ranged from bedrock to aquatic vegetation. Where flow was high, Umpqua chub were found near banks in shallow water (Markle et al. 1991).

## 2. Strategy for addressing the needs of native resident fishes

Most importantly, more information is necessary in order to determine the needs of each resident fish species but also to determine the needs of species assemblages. Resident freshwater fishes are found throughout watersheds, from first order streams, above impassable barriers, to estuaries. The general habitat needs are well known (conditions approximating undisturbed watersheds), however, specific requirements have not been identified for many species, and how these habitats and conditions should

be distributed through time and space to provide for fish needs cannot be specified with certainty. A conservation strategy for fish must therefore consider landscape-wide processes that seek to retain, restore, and protect those processes and landforms that contribute habitat elements to streams and promote good habitat conditions for fish. At the heart of this approach is the recognition that fish and other aquatic organisms have evolved within a dynamic environment that has been constantly influenced and changed by natural geomorphic and ecologic disturbances. Good stewardship of aquatic resources requires that land use activities not alter this disturbance regime beyond the range of conditions to which these organisms have become adapted (Thomas et al. 1993).

Any strategy should meet the following criteria to adequately attend to the needs of native resident fishes (follows Thomas et al. 1993; NMFS 1998):

1. Maintain or restore water quality to a degree that provides for stable and productive riparian and aquatic ecosystems. Water quality parameters that apply to these ecosystems include seasonal temperatures that mimic natural variability, sediment, dissolved oxygen, and nutrients.
2. Maintain or restore instream flow timing, magnitude, duration, and spatial distribution of peak, high and low flows.
3. Maintain or restore the sediment (both small particles and large woody debris) regime under which the riparian and aquatic ecosystems developed. Elements of the sediment regime include the timing, volume, and character of sediment input, storage and transport.

These physical parameters are affected by riparian and watershed conditions, therefore:

4. Maintain riparian habitats for physical integrity of the shoreline, bottom and banks.
5. Maintain riparian habitats so that the physical processes in 1, 2 and 3 above are restored or maintained to emulate natural ecological processes and disturbance regimes to which these organisms are adapted.
6. Increase older trees in riparian areas, landslide prone areas and headwater streams so that debris slides and flows contain large wood and boulders necessary for creating habitat further downstream.
7. Maintain or restore spatial and temporal connectivity of habitats especially between streams, floodplains, and uplands.
8. Given the importance of beaver ponds as rearing habitats and sediment traps, improve riparian conditions and beaver management at the watershed scale to provide for an increase in, and long-term maintenance of, well-distributed beaver populations.

These objectives necessitate that management provide for elimination or minimization of disturbance immediately adjacent to the stream and an area of mature or later-seral stage forest within a

surrounding transition zone. In the generic landscape, dominated by regeneration harvests and decreasing rotation ages, a buffer strategy may be the only possible way to provide for these conditions.

Since there is high uncertainty regarding the specific needs of many species and the response of natural processes to various management activities, the specific protective measures that should be applied to riparian buffers are very difficult to determine. To some extent, any practicable measure will represent some degree of risk to the species of concern. Still, the limited data that are available allow us to make educated judgements regarding relative risks. These risks will be manifested in terms of the width of the buffers, the degree of allowable management within the buffers and the areas to which they are applied.

Two recent publications (Spence et al. 1996 and Thomas et al. 1993) have presented recommendations for buffer widths designed to maintain riparian functions. The following information is presented as an overview of this literature to highlight previous work in this area.

Thomas et al. (1993) recommended the following buffer widths as minima depending on the topography and would be increased to include areas on either side of the stream extending from the edges of the active stream channel to the tip of any inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation:

For fish-bearing streams: the greater of the distances required due to local topography as discussed above or two site potential trees, 300ft horizontal distance (600 ft, including both sides of the stream.). The first 200ft for shade, large wood, detritus and favorable temperatures. The last 100 ft to maintain microclimate and to protect the first 200 ft from fire and wind damage and to help ensure that the integrity of the functional riparian area survives over the long-term to benefit fish habitat and riparian dependent species.

For permanently flowing nonfish bearing streams: the greater of the distances required due to local topography as discussed above or one site potential tree or 150ft (300 ft, including both sides of the stream channel).

For seasonally flowing or intermittent streams, wetlands less than one acre, landslides and landslide-prone areas: the greater of the distances required due to local topography as discussed above or to the extent of landslides or landslide-prone areas, or to a distance equal one site potential tree.

Other relevant buffer width considerations were provided by Spence et al. (1996):

- 1 site potential tree (spt) for recruitment of large wood debris
- 0.5 spt for incorporation of fine organic matter and bank stabilization
- 30-90 m for sediment trapping depending on slope and geology
- 1 spt for buffering of inputs of nutrients and dissolved materials
- 0.75 spt for stream shading

These are only two examples of buffer width considerations for the Pacific Northwest that have been published. These buffer widths serve as generic examples. Watershed analysis should be used to develop watershed or site specific buffer widths and land management criteria within those buffer widths to achieve the desired proper functioning riparian conditions.

### 3. NMFS proposal relative to resident native fishes

Prescriptions designed to benefit watershed health, through restoration of natural ecological processes using properly functioning coho habitat as the standard, will likely benefit other native fishes. In general, coho are found in healthy Coast Range watersheds. (Conversely, the lack of coho does not necessarily indicate poor watershed health; because coho are anadromous, factors outside the watershed may affect population health.) However, although coho are a reasonable indicator of watershed health, a better indicator is the structure of whole fish communities (Bisson et al. 1992). Persistent changes to stream habitats are more likely to be detectable through analysis of fish assemblages than through interpretation of long-term trends in the abundance of individual species (Bisson et al. 1992) such as coho.

Studies in which salmonid and non-salmonid habitat parameters are reported from Coast Range systems lend support to the premise that improving coho habitat will benefit other fish species. Minckley et al. (1986) separated distribution of western fishes into nine general areas: euryhaline, lowland, upland, montane, big river, stream, creek, lacustrine, and spring isolate. Chinook and coho inhabit all but spring isolate, montane, creek, and lacustrine areas. Coastal cutthroat trout and steelhead inhabit all but spring isolate areas. Native resident fishes, taken as a whole, inhabit all but spring isolate areas. This general overlap in distribution between anadromous salmonids and native resident fishes generally supports the use of coho as a model or indicator species. Li et al. (1987) summarized thermal tolerances of Pacific Northwest native fishes. The salmonids were stenotherms (able to withstand only small changes in temperature) as were some sculpin and lampreys. Four native resident species were mesotherms (able to withstand moderate temperature fluctuations) and six native resident species were eurytherms (able to withstand wide temperature fluctuations). Therefore, stenotherms would be the first group of fishes to show stress from changes in temperature. This also generally supports the use of coho as an indicator of good watershed conditions and a suitable surrogate for other native fishes.

Buffers of 300m on either side have been suggested for complete maintenance of natural variation of microclimate effects (Brososke in press). This may increase or decrease depending on stream and site conditions. As the buffer width decreases, widely fluctuating environmental variables will begin to have effects on the microclimate of the stream and surrounding riparian areas.

For fish bearing streams the NMFS proposal of one SPT is below the recommended buffer width of two SPT from Thomas et al. (1993). One SPT is similar to the recommendations of Spence et al. (1996) for recruitment of LWD and buffering of nutrients and dissolved materials.

For perennial non-fish bearing streams the NMFS proposal of 2/3 SPT is below the recommended buffer width of one SPT from Thomas et al. (1993) and below the recommended buffer width for

recruitment of LWD and buffering of nutrients and dissolved materials from Spence et al. 1996).

For seasonally flowing non-fish bearing or intermittent streams the NMFS proposal of  $\frac{1}{2}$  SPT is below the recommended buffer width of one SPT from Thomas et al. (1993).

While there is widespread agreement on the importance of buffer strips, many scientists disagree with applying a fixed width buffer to all streams. The differences between the buffer widths within NMFS's proposal and those suggested by Thomas et al. (1993) should not be used to draw any absolute conclusions. Both are conservative estimates made to be generically applied across varied landscapes. Specific buffer widths tied to local conditions and features should be derived from the application of watershed analysis. NMFS's interim measures should provide the necessary protection to maintain conditions for coho and other endemic salmonid and non-salmonid species until watershed analysis can be completed.

#### B. Amphibian Coast Range species of concern

Numerous amphibians are species of concern in Oregon. Not all of these species are included in this analysis. Some are terrestrial and not likely to be impacted by changes in riparian management. Others, while having varying levels of riparian and aquatic association, are also strongly dependent on non-riparian habitats (such as talus) not addressed in this proposal. Therefore, while these species may benefit from improved riparian management standards, this benefit may not be sufficient to fully meet the needs of the species. Finally, some species, while being strong riparian associates, have rather broad habitat tolerances and are sufficiently accommodated by conditions resulting from current forest practices. Our goal was to focus on species at highest risk, and therefore, of most concern to landowners, and most likely to benefit significantly from improved riparian standards.

A review of available literature and consultation with species experts suggests the following species are most likely to be impacted by changes to aquatic and riparian management standards within the range of the coho in the Oregon Coast Range: Rhyacotriton spp. (Cascades, Columbia and Southern Torrent salamanders), Dunn's salamander, Cope's giant salamander, Pacific giant salamander, tailed frog, Foothill yellow-legged frog, western toad, and red-legged frog. The above species are highly associated with stream-side riparian forests or wetland areas.

##### 1. Ecological requirements of the amphibian species of concern

The tailed frog, Foothill yellow-legged frog, the torrent salamanders, and Cope's and Pacific giant salamanders are all considered stream-breeders, that require cold, clear streams with rocky or gravelly bottoms, and are highly sensitive to sedimentation (Nussbaum et al. 1983, Bury and Corn 1991, Brown et al. 1993, Blaustein et al. 1995, D. Olson, pers. comm.). Dunn's salamander is a near-stream forest breeder that utilizes rock crevices and splash zones of these same clear, cold streams. Many of these species are also closely associated with the availability of coarse woody debris (CWD) in stream-side forest areas. Most stream/wetland-associated amphibians are also dependent on herbaceous, shrub and tree layers within riparian areas. High canopy cover (>75%) of each of these layers is considered important. Removal or disturbance of any of these layers through harvest has

been demonstrated to result in elimination of amphibians from streams for multi-year periods.

The red-legged frog and western toad are primarily pond-breeders, using ponds, lakes, marshes, and swamps. However, they also make use of the quiet backwaters of streams for breeding, and move along stream corridors (D. Olson, pers. comm.).

Numerous studies using relative abundance as an index of habitat suitability have noted the close association of many of these species with mature or later-seral stage forests. Abundance is consistently lowest in early successional forests. However, the importance of these older forests may be due to their ability to support appropriate microclimate and moisture conditions and this ability is not necessarily inherently age-related. The role of microclimate, and observations of at least minimal persistence in younger forest, suggest that alterations to current management practices may allow for support of these species within a generally second-growth, managed forest landscape. Indeed, some studies have demonstrated that even species most sensitive to logging do persist when riparian areas are adequately buffered compared to unbuffered sites. The larger the buffer, the higher the level of persistence. Other studies have shown that retention of high quality occupied habitat areas and appropriate connectivity conditions allows for fairly rapid repopulation of formerly occupied sites degraded by harvest.

The species of concern are exclusively or very strongly dependent on riparian and aquatic areas for most of their essential life functions (Nussbaum et al. 1983, Leonard et al. 1993, Blaustein et al. 1995). Many are associated with uncommon or local-scale habitats such as seeps, headwall areas or wetlands. Others are associated with areas which are in general more widespread across the landscape but provide only limited habitat suitability. As an example, many of the species of concern are stream associated but due to predation from fish are often absent from or present at sub-viable population levels along fish bearing streams (D. Darda, pers. comm., D. Olson, pers. comm.).

The species of concern require non-fish streams to maintain viable populations. In particular, perennial, high gradient streams with gravel, cobble or small boulder substrate, and moderate to high incidence of cascades, falls, steps and pools along stream reaches, are very important. Specific micro-sites associated with both perennial and seasonal first and second order stream channels are also important. These include inner gorges, tributary junctions, seeps, springs and other groundwater upwelling areas, splash zones and larger stream-associated wetlands. Numerous areas not directly associated with stream channels are also critical. These include headwalls and source areas of perennial streams, and non-stream-associated seeps, springs and wetlands.

## 2. Strategy for addressing the needs of the amphibian species of concern

Current state forest management regulations represent a partial habitat protection strategy that will potentially leave significant stretches of important streams and numerous site-specific habitats completely unprotected. The inherently patchy distribution of amphibian species population clusters, their reliance on micro-site conditions and high site-fidelity may result in the small percentage of areas that are assured buffering not representing actual occupied habitat (D. Olson, pers. comm.). Protective measures must have a high likelihood of 'capturing' the actual habitat-use areas. This is

most readily accomplished through broad application of the measures to all potential habitat.

Application of protective measures to all potential habitat not only increases the likelihood of actual use areas being contained within buffers but also allows for connectivity between these areas. Many of the species of concern possess rather limited dispersal ability and low dispersal habitat tolerances (Metter and Pauken 1969, Corn and Bury 1989, D. Olson, pers. comm., R.B. Bury, pers. comm.). Measures assuring protection for only a limited percentage of potential habitat may therefore result in larger gaps between population clusters. Low mobility may preclude movement of individuals between population clusters that are too-widely separated due to habitat fragmentation.

Even if occupied habitats or dispersal-capable habitats are 'captured' within buffers, narrow widths and management activity allowed within buffers can impact several factors contributing to suitability of the potential habitat areas. These factors include: inputs of organic matter (CWD, and fine organic matter) to stream channels; interstitial spaces in stream channel substrate; water temperatures; water quality (oxygen content, pollutants, etc); in-channel and off-channel pools; CWD, litter, organic/humus layers in adjacent riparian and near-stream terrestrial areas; soil density and moisture in adjacent riparian and near-stream terrestrial areas; understory vegetation in adjacent riparian and near-stream terrestrial areas, and; ambient air temperatures and humidity in adjacent riparian and near-stream terrestrial areas.

Current regulations result in numerous high-habitat value areas being either completely unprotected or contained within buffers that are too narrow or subject to management that precludes maintenance of critical life function values.

Based on a review of available information and consultation with species experts, a riparian and aquatic strategy should meet the following criteria to adequately meet the needs of amphibians:

- The strategy must reliably and consistently identify the specific stream segments and micro-sites with high habitat potential;
- All high habitat potential areas (stream segments and micro-sites) must be protected to such an extent that habitat suitability is maintained or enhanced, or, where degradation is unavoidable, result in rapid restoration of habitat suitability; and
- The strategy must allow for connectivity between habitat areas and across the landscape as a whole.

To meet the recommended criteria, any given riparian and aquatic strategy needs to treat the high habitat potential areas as special emphasis areas (SEAs) with management adjusted accordingly. (It is assumed that other, non-SEAs would be managed to standards that allow them to adequately contribute to overall proper riparian and aquatic function).

The potential management impacts to habitat suitability indicate that adjustments to management within and around these SEAs be focused on three key objectives:

- a) prevention of excessive on-site ground disturbance and erosion;
- b) “filtration” of off-site sediments, pollutants and micro-climate effects; and
- c) provision of residual woody features (large and coarse woody debris).

These objectives necessitate that SEA management provide for elimination or minimization of disturbance immediately adjacent to the site and an area of mature or later-seral stage forest within a surrounding transition zone.

Since there is high uncertainty regarding the specific needs of many species and the response of natural processes to various management activities, the specific protective measures that should be applied to SEA buffers are very difficult to determine. Literature reviews and summaries undertaken by the Washington Department of Fish and Wildlife, Priority Habitats and Species Division (1995), Spence et al. (1996), FEMAT (1993), Brososke (in press) and others suggest appropriate measures. Despite the variability and uncertainty inherent in these measures, they do allow us to generally judge whether a specific protective measure will result in a reasonable likelihood of meeting the needs of the amphibian species in question. They strongly suggest that the buffers incorporated into current forest practice regulations may not be sufficient to adequately maintain important riparian functions. The size of these buffers, and the fact that, as explained previously, they may be too intensively managed, or not applied to some SEAs, collectively represent a high degree of risk that the factors of habitat suitability and the needs of the species will not be supported.

To some extent, any practicable recommendation for more sufficient protective measures will represent some degree of risk to the species of concern. Still, as stated previously, the limited data that are available allow us to make educated judgements regarding relative risks. These risks will be manifested in terms of the width of the buffers, the degree of allowable management within the buffers and the areas to which they are applied.

Given the available information and a generic landscape, it would be difficult to conclude that riparian and aquatic strategies consisting of buffers averaging less than 100ft would be adequate to protect SEAs and meet the needs of the species. The extreme sensitivity of some site-specific SEAs such as wetlands, seeps, springs and source areas may necessitate even larger buffers.

All buffers should include an inner no harvest zone sufficient to maintain bank stability and minimize disturbance to streamside vegetation and soil. The remainder of the buffer should be subject to management designed to attain conditions associated with later-successional forests. Once these conditions are attained, management in the outer zone should be extremely limited. The exact size and extent of no-harvest zones, and allowable management within outer zones, can be determined only by balancing sensitivity/disturbance concerns with the desirability of more rapid attainment of mature forest conditions. Even within the managed outer zone, time intervals between entries should be such that restoration of disturbed conditions is accommodated. There are many situations in which disturbance should be avoided or minimized to the greatest extent practicable.

The sensitivity of some SEAs may necessitate the need for larger overall buffers and an expanded or all-encompassing no-harvest zone. Such expansions may be particularly critical around SEAs not

directly associated with streams since lack of protective side slopes and cold stream waters may make them more vulnerable to external climate and disturbance effects.

### 3. NMFS proposal relative to amphibian habitat requirements

Only those portions of the NMFS proposal most relevant to the amphibian species under consideration will be examined here. Perennial fish-bearing streams and associated management are not as critical to amphibians and will not be addressed here.

The NMFS prescriptions for perennial non-fish streams are generally consistent with the above recommendations. Under the NMFS proposal, such streams will receive a riparian management area (RMA) of 2/3 site-potential tree height (SPT). This will approximate 100ft in most of west-side Oregon. The level of management allowed within the outer RMA will minimize management-disturbance events and allow for maintenance and/or restoration of conditions typically associated with later-seral stage forest stands. As noted previously, many of the amphibian species of concern are to some extent associated with mature or older forests and are therefore likely to find suitable vegetative habitat conditions provided in the RMAs over time. The entry limitations applicable to the inner 30 ft essentially result in a no harvest zone which should minimize ground disturbance in this sensitive area.

As a result of a universal prescription for perennial non-fish streams, the highest habitat potential stream segments, and associated inner gorges, tributary junctions and splash zones are likely to be reliably and consistently identified and protected. These SEAs will be protected to an extent that habitat suitability is maintained or enhanced, or, where degradation is unavoidable, result in rapid restoration of habitat suitability.

Extension of the RMAs to capture streamside seeps, springs and areas of highly unstable soils is also consistent with our understanding that conditions associated with these areas are critical to the life functions of most of the species in question. (Note: We have assumed that 'extension' means all such areas within 2/3 SPT of a stream channel will be included within a buffer, itself 2/3 SPT from the edge of the special emphasis area and consisting of inner and outer zones similar to the stream RMA). As a result of this prescription, groundwater upwelling SEAs associated with perennial non-fish streams are likely to be reliably and consistently identified.

While the size of the RMA applied around seep and spring microsites should in itself be adequate, the level of allowable activity may present problems, particularly within the very sensitive portion of the RMA closest to the microsite. Harvest should be extremely limited or excluded within RMAs around seeps and springs. The close association of these groundwater upwelling SEAs with unstable slope areas may result in additional management limitations that address this concern.

Inclusion of all perennial streams and most seasonal non-fish streams in the protective measures of the NMFS proposal provides a high likelihood of assurance that watershed-wide connectivity between SEAs associated with perennial stream channels will be provided.

The value of seasonal non-fish streams for amphibians is most closely tied to the occurrence of specific adjacent micro-sites. The NMFS proposal calls for extension (see note above) of the RMAs associated with seasonal non-fish streams to capture the streamside seeps, springs and unstable soil areas that are likely to provide these micro-site conditions. These RMAs include an inner no-harvest zone and a heavily managed outer zone. The effective result of extension of these RMAs to micro-site SEAs will be no harvest areas ranging from 0-50ft, based on the slope gradient. Micro-sites on the lowest gradient areas will not be buffered with a no-harvest area. Where no harvest zones do not apply, relatively heavy management will occur with some restrictions designed to minimize excessive disturbance of critical soil and ground conditions and provide residual vegetative structure.

The buffer size represented by extension of the inner no harvest zones along higher-gradient seasonal streams to associated micro-site SEAs is less than that likely needed to maintain amphibian habitat suitability. Since lower gradient seasonal streams are not specifically protected in the NMFS proposal, micro-site SEAs associated with these channels will not be buffered at all. Steps should be taken to ensure that all SEAs associated with seasonal streams are identified and provided adequate levels of protection.

Similarly, SEAs not directly associated with stream channels, such as source areas and many other groundwater upwelling and wetland areas, are not specifically addressed in the NMFS proposal. Some groundwater upwelling areas and some source areas (especially those associated with headwalls) may receive at least partial protection incidental to the standards for managing mass-wasting potential. Management of unstable areas under the NMFS proposal is difficult to quantify, but habitat values associated with those areas subject to “No Practices” and “Limited Practices” might be reasonably protected. However, the uncertainties inherent in relying on slope stability measures to identify and protect habitat values do not allow us to conclude that non-channel associated SEAs will be protected to such an extent that habitat suitability is maintained or enhanced, or, where degradation is unavoidable, result in rapid restoration of habitat suitability. Obviously, since most non-stream wetlands will not be associated with unstable areas, slope stability management will do very little for protection of these SEAs.

Special Emphasis Areas not specifically addressed in the NMFS proposal will remain subject to standards contained in the current state forest practices regulations. They will experience continued degradation relative to amphibian habitat suitability due to ground disturbance and overstory vegetation removal. As a result, some non-stream associated high habitat potential areas critical to some riparian associated amphibians will not be protected to such an extent that habitat suitability is maintained or enhanced, or, where degradation is unavoidable, result in rapid restoration of habitat suitability.

The Road Management and Unstable Areas standards contained in the NMFS proposal are likely to result in long-term reductions in erosion, sedimentation and mass wasting, bringing them closer to the range expected naturally. In concert with RMA standards, this should significantly reduce degradation of in-stream habitat conditions for amphibians.

### C. Conclusions and Additional Considerations

Overall, the stream and road management measures proposed by NMFS provide a strong foundation for restoration of watershed-wide conditions over time. Implementation of these measures will not result in complete elimination of the adverse impacts currently degrading aquatic and riparian resources. Available literature and data suggest far more stringent measures would be necessary to accomplish this. However, the proposed measures are likely to maintain proper function where it currently exists and set degraded areas on a path towards restoration of proper function. Implementation of these measures on non-federal lands would go a long way towards allowing for coverage of riparian and aquatic associated species in habitat conservation plans for individual landowners.

The NMFS proposal represents a very significant improvement over current forest practices for riparian areas. These improvements should allow for maintenance and restoration of habitat values directly associated with fish bearing streams. These improvements should also allow for maintenance and restoration of the critical functions provided by non-fishing bearing streams in the overall aquatic/riparian system. Collectively, these improvements will benefit resident and anadromous fish species. The proposed measures for perennial non-fish bearing streams represent a reasonable likelihood that the highest habitat potential stream segments, and some associated micro-site habitats, will be identified and appropriate conditions supported for amphibians. Collectively, the measures for fish bearing and non-fish bearing streams, should also support connectivity of amphibian habitat across the landscape.

Not all the factors that influence riparian/aquatic systems are completely addressed in the NMFS proposal. Management standards for many site-specific habitat areas would need to be refined and improved to meet the habitat requirements of the amphibian species of concern. These areas include all perennial seeps, springs and groundwater upwelling areas, stream source areas and larger wetlands. Management of these areas should include an adequate level of protection to minimize or eliminate disturbance. Such protection would benefit not only the amphibian species addressed in this document, but also other wetland obligate species.

Absent the improved standards mentioned above, unstable soil and steep slope management standards can be refined to include specific identification and consideration of associated habitat values. Prescriptions developed for mass-wasting areas should be conservative enough to protect these values in addition to other geo-physical attributes and values. Such improvements and the current NMFS proposal may collectively represent a reasonable likelihood of meeting the needs of amphibian species closely associated with riparian forests.

Outside of road management standards, the use of pesticides, herbicides and other chemicals are not specifically addressed in the NMFS proposal. The sensitivity of many fish and amphibian species, uncertainty regarding long-term response to certain chemicals, and the relatively liberal standards contained in the current Forest Practices Act precludes the Service from concluding that use of these products would not adversely impact the species of concern.

The NMFS proposal also allows for deviations from the suggested standards following future watershed analyses or assessments. Watershed analysis protocols currently utilized on non-federal

lands are based primarily on geophysical and in-stream processes, with biological or habitat concerns limited to those for salmonid fish. Resultant prescriptions reflect this lack of consideration for important biological and habitat-based concerns and are not likely to meet the needs of most amphibian species unless the protocols for watershed assessment are expanded. Watershed Assessments should be refined and improved so that resultant prescriptions consider the biological and habitat factors critical to support non-fish species.

Some areas, such as the Umpqua and Rogue Basins, are subject to high summer temperatures and seasonal drought. Temperature, moisture and water flow factors can become very limiting during summer months. Critical breeding and larval development functions, and survival of individuals are reduced or precluded as these limiting factors reach threshold levels. These conditions may necessitate stronger or more widely applied protections in selected areas.

Finally, our conclusions are based on a generic analysis. We have assumed standard, high-intensity, short-rotation (45-60 yrs) industrial forest management. Alternative measures may be warranted or necessary based on site or ownership specific conditions, the type of management regime being implemented, and the potential impacts of that management regime.

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